REMARKS

Claims 1 – 3 and 5 – 7 remain in the application for reconsideration by the Examiner.

The Examiner rejected Claims 1, 3, and 5 under 35 USC 103(a) as being obvious over primary reference U.S. Patent No. 6,428,735 B1 to Deemer et al. (Deemer), in view of secondary references U.S. Patent No. 6,258,313 B1 to Gottlieb (Gottlieb) and textbook references by Genekoplis (Genekoplis) and Tipler (Tipler). The Examiner stated:

> "Regarding claim I, Deemer et al teach a reheat stretch blow-molding process (abstract) comprising: preparing a preform (col 4 lines 18-35), heating the preform, utilizing a plurality of infrared energy sources positioned adjacent said preform (col 8 lines 8-28). Deemer et al also teach the ability for the heating lamps to have an adjustable temperature control to meet the heating needs of a segment of the preform (col 8 lines 8-14).
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> "In addition, Deemer et al teach that the energy source for heating preforms for blow-molding is adjustable permitting each, as necessary, to have a position with a different amount of space from each energy source to the preform (col 7 lines 66-67 & col 8 lines 1-2), suggesting amount of heating of the preform could be controlled by the position of the energy source to the preform. Deemer et al also teach that sidewall thickness of the preform is not constant and that varying thickness in a preform could be heated so that the temperature is consistent at all thickness (col 5 lines 33-38). Furthermore, Deemer et al suggests that it is more difficult to drive heat through thicker parts of the preform (col 6 lines 40-43) as supported by Fourier's Law of heat conduction taught by Geankoplis: rate of heat transfer process = driving force / resistance. In our present discussion, the driving force is the temperature difference between the outer wall and the inner wall or in other words the energy from the infrared source. The resistance is the thickness of the wall. To those of ordinary skill in the art, Fourier's law clearly shows a relationship that as the thickness of the heated substrate increases the energy from the heating source needs to increase as well in order to maintain consistent temperature throughout the heated object with varying thicknesses.
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> "Concerning the inversely proportional spacing of the energy source to the preform, Deemer inherently teaches that since more energy is needed for thicker parts of the preform the lamp must be positioned closer to the preform (col 7 lines 66-67 & col 8 lines 1-2). This is supported by the equation of the intensity of a point source taught by Tipler: $I=P/4(pi)r^2$. Where I is the intensity, P is the power of the source, and r is the distance from the source to the object being heated. The above equation shows that in order to increase

the intensity/amount of heating at a given point, at constant P, the distance, r, would need to be decreased, clearly an inverse relationship. Therefore in order to provide more heating for thicker preforms, one would decrease the distance between the energy source and the preform.

"However, Deemer et al do not teach that the reheat blow-molded preform is polypropylene. Nevertheless Gottlieb teaches using polypropylene preform to reheat stretch blow-mold into a bottle (abstract). Therefore it would have been obvious to use polypropylene in Deemer et al's method of reheat stretch blow-molding in order to produce high clarity container made from polypropylene with enhanced oxygen barrier (col 2 lines 7-12).

"Regarding claim 3, Deemer et al do not teach that the polypropylene contains one or more adjuvants selected from the group consisting of clarifiers, fillers, extenders, lubricants, and infrared energy absorbing agents. However, Gottlieb teaches using clarifiers to reheat stretch blow-mold a preform (col 2 lines 7-13). Therefore it would have been obvious to use the teachings of Gottlieb in Deemer et al's method for reheat stretch blow-molding in order to provide clarified polymer resins (col 2 line 8).

"Regarding claim 5, Deemer et al teach using infrared energy sources comprising heat lamps (col 6 lines 15-20)."

An embodiment of Applicants' invention is set forth in Claim 1. It is directed to a process, comprising: preparing a polypropylene preform; and heating the preform, utilizing a plurality of infrared energy sources positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources. Dependent Claims 2, 3, and 5 contain at least the same features and limitations as Claim 1.

Applicants' invention as set forth in the embodiment of Claim 6 is direct to a process, comprising: preparing a polypropylene preform, said polypropylene selected from the group consisting of high, medium, and low density polypropylene, said polypropylene containing one or more adjuvants selected from the group consisting of clarifiers, fillers, extenders, lubricants, and infrared energy absorbing agents; and heating the preform, utilizing a plurality of infrared energy sources positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources, wherein the infrared energy sources are closest to the preform wall adjacent a portion of the preform having the greatest thickness. Dependent Claim 7 contains at least the same features and limitations as Claim 6.

Deemer discloses a method for making a bottle with an internal web structure. Deemer discloses that it is well-known to pass a plastic preform through a heating chamber, so that it may be heated to its blow molding temperature, wherein "... the preform is... a distance from a controllable energy source..." (column 1, lines 52 and 53, emphasis added). Thus, by "controlling" the energy to the heater elements, more or less heat may be radiated toward the preform so that it is differentially heated.

Deemer discloses that its energy sources 76 are adjustable in parallel and perpendicular directions (column 8, lines 3 and 4). This allows the energy sources 76 to be adjusted to conform to the exterior shape of the preform; as illustrated in Figure 12 where it is shown that each energy source 76 is positioned an equal distance away from the surface of the preform 44.

Deemer's process utilizes a series of heaters and reflectors positioned at strategic points along the path of travel for any particular preform as it passes through the oven. As the preform is conveyed through the oven, it is simultaneously rotated. The heaters and reflectors are indexed along the path taken by the preform, so that certain regions on the exterior circumference of the preform are repeatedly exposed to more infrared energy, while other regions on the exterior circumference of the same preform are repeatedly exposed to less heat energy. This provides more heat energy to the sides of the preform where the internal web is attached to the preform sidewall (and thus, the sidewall is thicker), and less heat energy to the sides of the preform where only the thinner sidewall is heated. Thus, the preform is circumferentially, differentially heated by Deemer's process.

Importantly, it must be noted that Deemer does not teach nor even remotely suggest that the heaters 76 along the path of travel for any particular preform should be positioned alternatively closer then farther away from the rotating, progressing preform in order to preferentially heat different areas on the circumference of the preform. Such a teaching, if it were present in the Deemer reference, would be analogous to Applicants' claimed invention; i.e., a teaching that the heaters 76 should alternatively be closer then farther away from the preform in a manner inversely proportional to the wall thickness of the preform (closer where the wall and

internal web is to be heated, and farther away where only the sidewall of the preform is to be heated). Deemer, in fact, specifically teaches away from such a method; disclosing instead that thicker and thinner areas of the preforms' sidewalls are to be differentially heated only by utilizing a plurality of uniformly positioned heaters 76 that can be controlled, or turned on and off, in combination with a series of strategically positioned reflectors that intensify the heat energy at certain points along the path of conveyance of the preforms.

Deemer discloses that its process may also be used to heat preforms "... where the sidewall thickness is not constant around the circumference of the preform" (column 5, lines 34-36). Again, the preferential heating is accomplished only by the use of uniformly positioned heaters 76, which may be turned on or off (column 8, lines 29-46), and by strategically placed reflectors; not by positioning the heaters 76 closer or farther away from the preform as a function of the thickness of the preform wall as the sidewall is presented to an individual heather 76.

Clearly, Deemer fails to teach Applicants' claimed step of heating a preform utilizing a plurality of infrared energy sources positioned adjacent the preform at distances inversely proportional to the wall thickness of the preform directly apposing the infrared energy sources. To suggest otherwise is disingenuous.

Gottlieb discloses a stretch blow molding process, wherein a preform is heated on the interior by a hot gas or an IR radiation source, and on the exterior by exposure to IR radiation rods or lamps (column 2, lines 25-27). The preform may be differentially heated along its longitudinal axis by controlling and differentiating the amount of electrical energy supplied to the individual IR radiation rods. See, e.g., column 4, lines 20 - 22; viz, "[p]referably the infrared rods 38 are separately controlled such that the outside of preform 16 can be longitudinally differentially heated."

Accordingly, Gottlieb does not teach nor even remotely suggest the required limitation set forth in Applicants' Claims, that "... the infrared energy sources [be] positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources." Gottlieb

teaches that heating a preform having varying longitudinal thicknesses is accomplished by increasing or decreasing the amount of electrical energy supplied to the exterior IR radiation sources (column 4, lines 23-25); viz, "[t]he apparatus of the present invention can be preferentially controlled so that it can be adapted for use with plastics of varying... shapes of preforms."

Gottlieb does not cure the deficiencies of Deemer. Neither Deemer nor Gottlieb, nor their combination, teaches Applicants' claimed limitation, that "... the infrared energy sources [be] positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources." To the contrary, Gottlieb merely reinforces the concept of controlling, or turning on and off, the infrared energy heaters as described at column 1, lines 51-54 and column 8, lines 29-46 of Deemer.

Genekoplis discloses Fourier's law, describing the relationship between, inter alia, the rate of heat transfer versus distance between a heat source and a target. Fourier's law is an expression of one aspect of the operation of Deemer's process for differentially heating the exterior of a preform by increasing or decreasing the electrical power applied to individual IR radiation sources within the array of exterior preform heaters and using heat reflectors. Genekoplis does not teach nor even remotely suggest modifying the operation of Deemer's process. Genekoplis merely mathematically describes an aspect of Deemer's process.

Genekoplis does not cure the deficiencies of Deemer and Gottlieb. Neither Deemer, Gottlieb, nor Genekoplis, nor their combination, discloses Applicants' claimed limitation, that "... the infrared energy sources [be] positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources."

Tipler discloses another mathematical relationship that describes yet another aspect of Deemer's operation. Tipler discloses, inter alia, a relationship between energy intensity and distance between an IR radiation source and target. Like Genekoplis, Tipler does not teach nor even remotely suggest modifying the way Deemer differentially heats the exterior of a preform. Tipler merely mathematically

describes one aspect of Deemer's process.

Tipler does not cure the deficiencies of Deemer, Gottlieb, and Genekoplis, either alone or in combination. The combination of Deemer, Gottlieb, Genekoplis, and Tipler does not suggest the required limitation set forth in all of Applicants' Claims; viz, that "... the infrared energy sources [be] positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources."

Applicants respectfully submit that the Examiner has not demonstrated the obviousness of Claims 1, 3, and 5, given Deemer, Gottlieb, Genekoplis, and Tipler. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw this 35 USC 103(a) rejection.

The Examiner rejected Claim 2 under 35 USC 103(a) as being obvious over the primary reference Deemer, in view of the secondary references Gottlieb, Genekoplis, Tipler, and U.S. Patent No. 5,819,991 to Kohn et al. (Kohn). The Examiner stated:

> "Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deemer et al (6428735) in view of Gottlieb (6258313) supported by Geankoplis, Transport Processes and Unit Operations Third Edition (Pg 216-217) and Tipler Physics For Scientists and Engineers (Pg 445-446) further in view of Kohn et al (5819991). The teachings of Deemer et al in view of Gottlieb are applied as described above for claims 1, 3, and 5. Deemer et al do not teach that the polypropylene comprises polypropylene selected from the group consisting of high, medium, and low-density polypropylene. However, Kohn et al teach using high density polypropylene for making blow-molded bottle-type container (claim 4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Kohn et al in Gottlieb's method for reheat stretch blow-molding, in order to obtain a desired material property such as stiffness and strength."

Kohn discloses the use of high density polypropylene for making a bottle. Kohn does not disclose heating a blow molding preform using "... infrared energy sources positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources" as required in Applicants' Claim 2. Kohn does not cure the deficiencies of Deemer,

Gottlieb, Genekoplis, and Tipler, either alone, or in combination with all or any of them. Applicants respectfully submit that the Examiner has not demonstrated the obviousness of Claim 2, given Deemer, Gottlieb, Genekoplis, Tipler, and Kohn. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the 35 USC 103(a) rejection.

The Examiner rejected Claims 6 and 7 under 35 USC 103(a) as being obvious over the primary reference Deemer, in view of secondary references Gottlieb, Kohn, Genekoplis, and Tipler. The Examiner stated:

> "Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deemer et al (6428735) in view of Gottlieb (6258313) and Kohn et al (5819991), supported by Geankoplis, Transport Processes and Unit Operations Third Edition (Pg 2 16-217) and Tipler, Physics For Scientists and Engineers (Pg 445-446).
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> "Regarding claim 6, Deemer et al teach a reheat stretch blow-molding process (abstract) comprising: preparing a preform (col 4 lines 18-35), heating the preform, utilizing a plurality of infrared energy sources positioned adjacent said preform (col 8 lines 8-28). Deemer et al also teach the ability for the heating lamps to have an adjustable temperature control to meet the heating needs of a segment of the preform (col 8 lines 8-14).
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> "In addition, Deemer et al teach that the energy source for heating preforms for blow-molding is adjustable permitting each, as necessary, to have a position with a different amount of space from each energy source to the preform (col 7 lines 66-67 & col 8 lines 1-2), suggesting amount of heating of the preform could be controlled by the position of the energy source to the preform. Deemer et al also teach that sidewall thickness of the preform is not constant and that varying thickness in a preform could be heated so that the temperature is consistent at all thickness (col 5 lines 33-38). Furthermore, Deemer et al suggests that it is more difficult to drive heat through thicker parts of the preform (col 6 lines 40-43) as supported by Fourier's Law of heat conduction taught by Geankoplis: rate of heat transfer process = driving force/resistance. In our present discussion, the driving force is the temperature difference between the outer wall and the inner wall or in other words the energy from the infrared source. The resistance is the thickness of the wall. To those of ordinary skill in the art, Fourier's law clearly shows a relationship that as the thickness of the heated substrate increases the energy from the heating source needs to increase as well in order to maintain consistent temperature throughout the heated object with varying thicknesses.
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> "Concerning the inversely proportional spacing of the energy source to the preform, Deemer inherently teaches that since more energy is needed for thicker parts of the preform the lamp must be positioned closer to the preform (col 7 lines 66-67 & col 8 lines 1-2). This is supported by the equation of the

intensity of a point source taught by Tipler: $I=P/4\pi r^2$. Where I is the intensity, P is the power of the source, and r is the distance from the source to the object being heated. The above equation shows that in order to increase the intensity/amount of heating at a given point, at constant P, the distance, r, would need to be decreased, clearly an inverse relationship. Therefore in order to provide more heating for thicker preforms, one would decrease the distance between the energy source and the preform.

"However, Deemer et al do not teach that the reheat blow-molded preform is polypropylene. Nevertheless Gottlieb teaches using polypropylene preform to reheat stretch blow-mold into a bottle (abstract). Therefore it would have been obvious to use polypropylene in Deemer et al's method of reheat stretch blow-molding in order to produce high clarity container made from polypropylene with enhanced oxygen barrier (col 2 lines 7-12).

"Deemer et al do not teach that the polypropylene contains one or more adjuvants selected from the group consisting of clarifiers, fillers, extenders, lubricants, and infrared energy absorbing agents. However, Gottlieb teaches using clarifiers to reheat stretch blow-mold a preform (col 2 lines 7-13). Therefore it would have been obvious to use the teachings of Gottlieb in Deemer et al's method for reheat stretch blow-molding in order to provide clarified polymer resins (col 2 line 8).

"Deemer et al do not teach that the polypropylene comprises polypropylene selected from the group consisting of high, medium, and low-density polypropylene. However, Kohn et al teach using high density polypropylene for making blow-molded bottle-type container (claim 4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use the teachings of Kohn et al in Gottlieb's method for reheat stretch blow-molding in order to obtain a desired material property such as stiffness and strength.

"Regarding claim 7, Deemer et al teach using infrared energy sources comprising heat lamps (col 6 lines 15-20)."

As set forth hereinabove, neither the primary reference Deemer, nor the secondary references Gottlieb, Kohn, Genekoplis, or Tipler, either alone or in any combination thereof, teach Applicants' claimed limitation, that "... the infrared energy sources [be] positioned adjacent said preform at distances inversely proportional to the wall thickness of said preform directly apposing said infrared energy sources" as set forth in Claims 6 and 7. Thus, Applicants respectfully submit that the Examiner has failed to demonstrated the obviousness of Claims 6 and 7, given Deemer, Gottlieb, Kohn, Genekoplis, Tipler, and Kohn. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the 35 USC 103(a) rejection.

Applicants yet again have made a sincere effort to distinguish the claimed invention over the cited prior art. Applicants work for a small entity, with limited resources available for patent prosecution. Accordingly, Applicants earnestly solicit a Notice of Allowance for the instant application. If the Examiner feels that a telephonic discussion would advance the issuance of such a Notice of Allowance, the Examiner is cordially invited to call the undersigned Attorney.